May 24, 1966 W. E. MOODY 3,252,304

YIELDABLE DRIVE CONNECTION FOR LAWN MOWERS AND THE LIKE

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Fig. 1

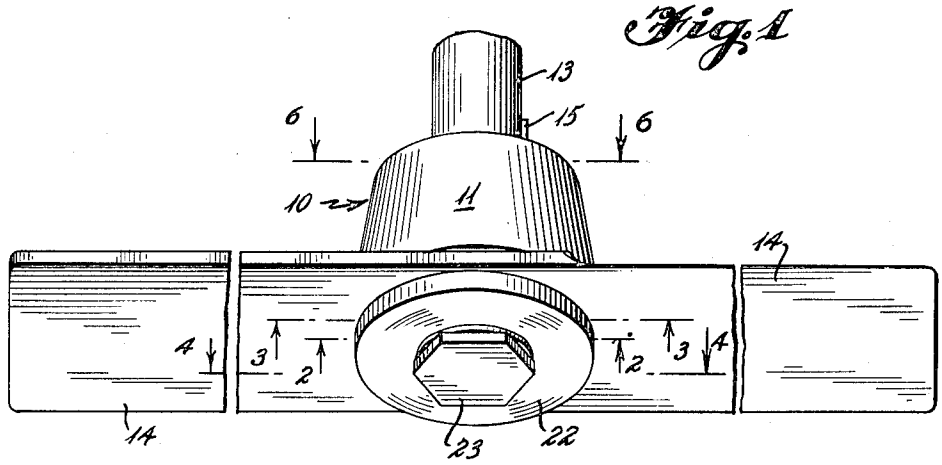


Fig. 2

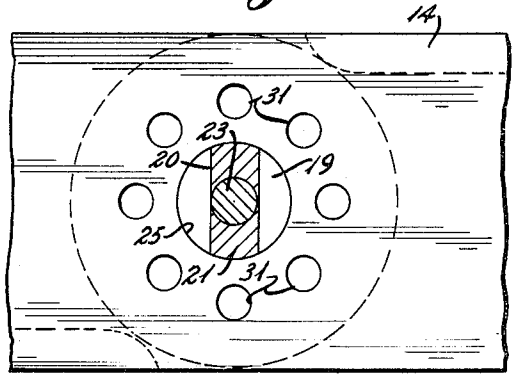


Fig. 3

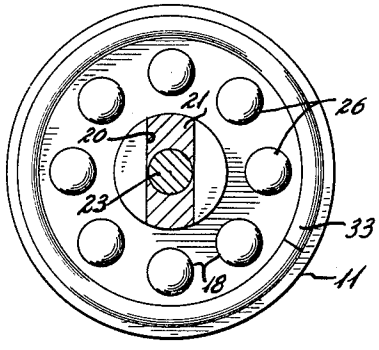
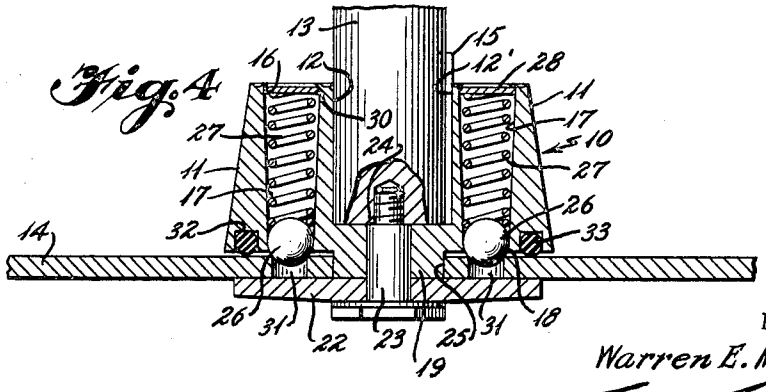


Fig. 4



INVENTOR

Warren E. Moody

BY

ATTORNEY

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Fig. 5

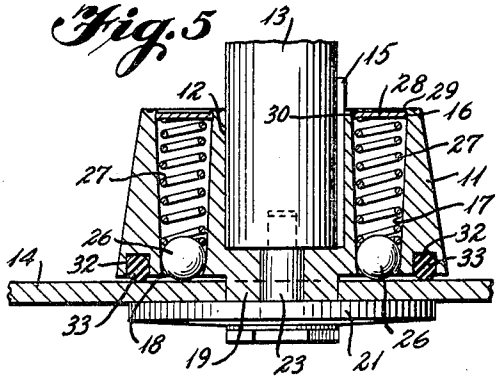


Fig. 6

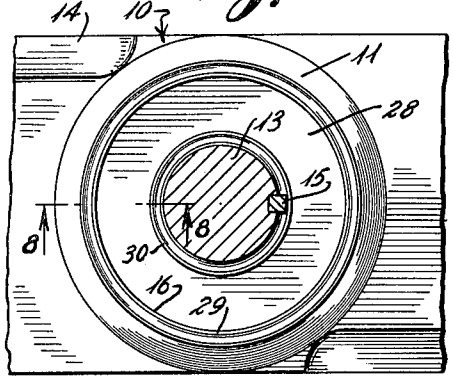


Fig. 7

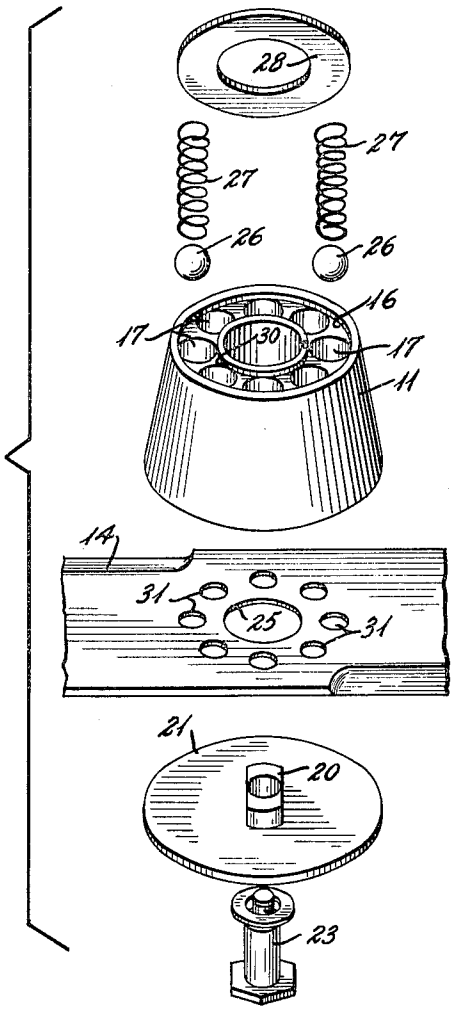


Fig. 8

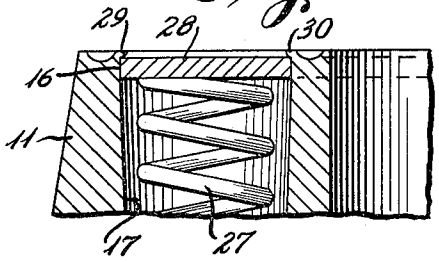
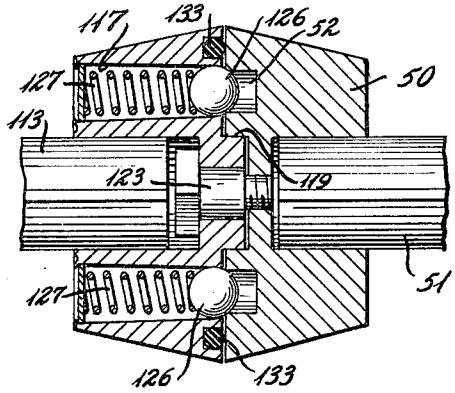


Fig. 9



INVENTOR

Warren E. Moody

BY Owen Clements

ATTORNEY

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3,252,304

YIELDABLE DRIVE CONNECTION FOR LAWN MOWERS AND THE LIKE

Warren E. Moody, 95 Fiesta Way, Fort Lauderdale, Fla.

Filed Oct. 28, 1963, Ser. No. 319,451
3 Claims. (Cl. 64—29)

This invention relates to a yieldable drive connection and to a method of assembly thereof for two relatively movable parts and more particularly to such a connection between the drive shaft of a motor driven rotary lawn mower and the cutting blade somewhat after the manner shown in my prior U.S. Patent No. 2,978,858, issued April 11, 1961.

In the manufacture of the device according to the prior patent, aforesaid, manufacture and assembly, costs and problems were encountered which rendered it difficult to produce as there shown and in the quantities required, devices having the desired uniformity in function and operation. Hence the present invention has overcome the noted difficulties and has produced a commercially, successful device of the type described having the improved properties and which is therefore, far simpler to assemble.

An object of this invention, therefore, is the production of a yieldable drive connection of the type described which is easily assembled as a unit.

Another object of this invention is the production of a yieldable drive connection of the type described wherein the yieldable driving members are retained in a driving head to engage the cutter bar with substantially uniform force.

A further object of this invention is the production of a driving head in which a plurality of yieldable driving members are held under substantially uniform force by a single retainer plate.

Still another object of this invention is the provision of a method of assembly of the driving head of a yieldable drive connection.

These and other objects will become apparent as the following specification proceeds, which specification when taken with the accompanying drawings forms a complete disclosure of my invention.

In the drawings, wherein like parts are represented by like characters of reference:

FIG. 1 is a perspective bottom view of the device of this invention, with the attached cutter blade;

FIG. 2 is a horizontal section substantially on the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a horizontal section substantially on the line 3—3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is a vertical section taken substantially on the line 4—4 of FIG. 1, showing the operative position of the connecting device;

FIG. 5 is a view similar to FIG. 4 showing the yielding connection as if the cutter blade had struck an obstruction;

FIG. 6 is a plan view of the device;

FIG. 7 is an isometric exploded view;

FIG. 8 is a vertical section substantially on the line 8—8 of FIG. 6, and

FIG. 9 is a vertical section of a slightly modified form of the device for yieldingly connecting a motor or other drive shaft to a horizontal driven shaft.

Referring now to FIGS. 1 to 8, the device of this invention is indicated as a whole by the numeral **10**, and comprises generally a housing or block having a generally circular cross section. An axial passage **12** is bored or drilled part way through the housing to receive a drive shaft **13** which may be the shaft of a suitable prime mover or a shaft suitably connected to such prime mover. A keyway **12'** is formed in the passage **12** to receive a key

15 on the drive shaft **13**. The housing **11** is provided at its upper end with an annular seat **16** for a purpose later to appear.

An annular series of axially directed openings or holes **17** is formed in the housing **11** during the casting operation. These holes **17** are shown as being slightly tapered. This taper serves no purpose other than to permit withdrawal of the molding core. A slightly inturned lip **18** is formed at the bottom of each hole for a purpose later to appear.

The lower end of the housing or block **11** is provided with a cylindrical boss **19** having a transverse slot **20** adapted to engage a transverse key **21** on the washer **22** which holds a blade **14** on the housing **11** by means of the washer, a bolt **23** threaded into the shaft **13** and having a flange **24** engaging the lower end of said shaft. The blade **14** has an opening **25** adapted to fit freely on the boss **19**, and is free for rotation about said boss.

To couple the blade **14** for rotation with the shaft **13**, I provide balls **26** in the holes **17** which project slightly less than radial distance through the holes **17** and normally rest on the lips **18**. Above the balls **26**, I place helical springs **27** which are retained in the holes **17**, under high compression, by means of an annular washer **28**. The washer **28** is retained on the annular seat **16** by having some of the metal of the block spun over the edge of the washer **28** as at **29** and **30**, shown best in FIG. 8. The blade **14** is provided with an annular series of ball seat-type opening **31**, in vertical alignment with the holes **17** and equal in number. In normal use, as shown in FIG. 4, the balls **26** project into the openings **31** to cause the blade **14** to rotate with the shaft **13**. Should the blade **14** encounter an object or obstruction, which could cause serious damage to a rigid blade, it will periodically de-clutch as in FIG. 5. The noise made by the clutching and de-clutching would alert an operator to trouble and he would stop the prime mover until the obstruction was removed.

In order to prevent entry of dirt or any damaging foreign matter into the area of the clutching elements surrounding the central boss **19**, an annular groove **32** is provided in the lower face or end of the housing **11**, in which a suitable elastomeric seal **33** is placed, so that it projects from and yieldably engages the upper face of the blade **14** circumferentially of the hub **19** and outwardly of the annular series of ball seat-type openings.

A modification is shown in FIG. 9, as a coupling **110** in which the housing **111** is like the housing **11** and has openings **117**, compression springs **127**, balls **126** and seal **133**. The housing **111** is keyed or otherwise connected to a shaft **113** for rotation therewith. A complementary coupling member **50**, of size and shape similar to the housing **11**, is keyed or otherwise connected for rotation with the shaft **51**. Member **50** is provided with an annular series of depressions **52** in axial alignment with the openings **117** and equal in number therewith. The member **50** is rotatably retained on the housing **111** by means of a bolt **123**. The coupling is normally operative as shown in FIG. 9. However, should the load on the shaft **51** be greater than the torque provided by the shaft **113**, the coupling will periodically disengage and engage, as described for the blade **14** and the housing **11**, with noise which would alert an operator to trouble.

Having now described my invention in certain preferred forms, I desire it to be understood that modifications and changes may be made within the skill of the art and the scope of the appended claims.

I claim:

1. A yieldable drive connection for coupling the drive shaft of a motor driven rotary lawn mower to the cutter blade thereof, said connection comprising a block having a generally circular cross section and an axial opening to

accommodate the drive shaft, a plurality of openings in said block annularly arranged about the axis of said drive shaft, each opening having a slight lip at its lower end, balls in said openings projecting less than radius distance below said balls, springs above said block under compression, an annular space in the upper end of said block, a retaining annulus in said space, holding said springs under compression on said balls inturned lips formed of metal spun from said block over the edge of said space and engaging the inner and outer rims of said annulus to positively secure said annulus in said space at a predetermined depth therein, a hub on one end of the block, and a cutter blade having a plurality of annularly arranged openings in axial alignment with the openings in the block mounted on the hub, the balls in the block projecting into the openings in the blade, whereby said balls yield upon engagement of said cutter blade with an obstruction to stop rotation of said blade.

2. The structure defined by claim 1 in which an annular elastomeric seal projects from the lower face of said block into engagement with said blade outwardly of said annularly arranged seat-type openings therein.

3. The structure defined by claim 1 in which an annular groove is formed in the lower face of said block surrounding said ball carrying openings, and an elastomeric O-ring seated in said groove and engaging said blade outwardly of said annularly arranged seat-type openings therein.

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BROUGHTON G. DURHAM, *Primary Examiner.*

HALL C. COE, *Assistant Examiner.*